

Remarks

Status of Claims

Claims 46-62, 67-68 and 73-78 were withdrawn from consideration by the Examiner. In addition to Claims 63-66 and 69-72, Applicants hereby submit Claims 79-88, which depend from Claim 63, and Claims 89-103, which depend from Claim 69. The newly added dependent claims are substantially based on the previously present composition of matter claims. No new matter has been added.

Applicants note that prior to the present amendment, the application contained 33 total claims, 4 of which were independent claims and 1 of which was a multiple dependent claim. The application currently contains 33 total claims, 2 of which are independent claims.

Claim Rejections Under 35 USC § 103

Claims 63-66 and 69-72 were rejected under 35 USC § 103(a) as being unpatentable over Larson '321, in view of Cody et al. '886. In particular, the Examiner finds that Larsen teaches a method of reducing soluble chromate in cement comprising mixing the cement with iron (II) sulphate monohydrate. Larson does not teach obtaining the iron (II) sulphate monohydrate by concentrating sulfuric acid. Nevertheless, the Examiner maintains that it is Applicants' burden to demonstrate that the iron (II) sulphate monohydrate produced by concentrating an iron (II) sulphate monohydrate-containing used sulphuric acid and separating the sulphuric acid from the obtained precipitate is materially different.

Cody et al. teach a process to obtain iron (II) sulphate heptahydrate by crystallization from sulfuric acid.

The Examiner finds that it would have obvious to dry the iron (II) sulphate heptahydrate of Cody et al., to produce iron (II) sulphate monohydrate for use in chromate reduction in cement, as taught by Larsen.

With regard to Claim 69, the Examiner finds that Larson teaches the use of ferrous sulfate heptahydrate (green salt) as a chromate reducing agent. Thus, it would be

prima facie obvious to combine the ferrous sulfate monohydrate and the ferrous sulfate heptahydrate for use as a chromate reducing agent in cement.

Response Regarding Claims 69-72 and 89-103

Applicants submit the following expert reports, pursuant to 37 CFR § 1.132, in traverse of the pending rejection:

- Technical Report TB-QSA 0094/2010/F “Examination of the Effectiveness of Chromate Reducers,” issued July 28, 2010 (Exhibit 1(a) English language translation / Exhibit 1(b) German language original); and
- Declaration of Dr. Gerhard Auer re: “US Application No. 10/569,333 (Exhibit 2).”

Applicants note that similar issues arose in a related case, namely US Application No. 10/569,333, with regard to which there is an application to assign the rights to the assignee of the present application, namely US 10/564,651. Thus, the aforementioned patent applications are jointly owned. Applicants further note that Dr. Auer is a co-inventor of the present application and employee of CRENOX, formerly Tronox Pigments, GmbH, formerly Kerr-McGee Pigments, GmbH. Finally, Applicants note that a Verification is attached to the Declaration of Dr. Auer, referencing the present case, to overcome any deficiencies in the “declaration” contained in ¶ 6 of the document.

The Declaration of Dr. Auer discusses the identity and preparation of samples A-E, which were tested as chromate reducing agents in cement, as outlined in Technical Report TB-QSA 0094/2010/F (Exhibit 1). Referring to Exhibit 1, Copperas (green salt), filter salt (essentially iron (II) sulfate monohydrate obtained from the used sulfuric acid produced during titanium dioxide production), and three mixtures of Copperas and filter salt were tested. Applicants are in the process of obtaining a Verification in the form of a declaration for Exhibit 1 and will promptly submit the Verification in the present application.

The Examiner’s attention is directed to §§ 3.1 and 3.2 of Exhibit 1, reporting the reduction in chromate achieved with the various compositions. In particular, § 3.2 “Effectiveness when ground,” shows the effect of compositions A-E at 0.7 kg/t/ppm and

1.3 kg/t/ppm. The mixtures of the Copperas and filter salt reduce the chromate content in cement significantly better than either the Copperas (green salt) or filter salt alone.

Applicants submit that the mixture of green salt and iron (II) sulphate monohydrate produced by concentrating an iron (II) sulphate-containing used sulphuric acid, as claimed in Claims 69-72 and 89-103, is a synergistic effect, relative either compound used alone. "When considering obviousness of a combination of known elements, the operative question is thus 'whether the improvement is more than the predictable use of prior art elements according to their established functions.'" MPEP § 2141, quoting *KSR v. Teleflex*, 82 USPQ2d 1385, 1396 (2007). In the present case, the improved chromate reducing effect achieved by the combination of green salt and filter salt is unexpected. Applicants note that evidence of unexpected results is strong evidence of nonobviousness. See *Examination Guidelines Update: Developments in the Obviousness Inquiry After KSR v. Teleflex*, Federal Register / Vol. 75, No. 169 (Sept. 1, 2010), pp. 53645, col. 3 and 53655, col. 3.

Response Regarding Claims 63-66 and 79-88

Applicants submit the following expert reports, pursuant to 37 CFR § 1.132, in traverse of the pending rejection:

- Technical Report F 7067/1 IBAC (Institute of Building Materials Research Aachen) "Determination of the efficiency and resistance of ferrous sulphates as a chromate reductant" March 23, 2009 (Exhibit 3(a) English language translation / Exhibit 3(b) German language original); and
- Technical Report V 08/24 "Production of conditioned filter salts with titanium contents of 2.5-20% relating to iron for examination in cements" September 9, 2008 (Exhibit 4(a) English language translation / 4(b) German language original).

Applicants note that Claim 63 has been amended to delete the alternative of a precipitate having a "manganese content of 1.5 to 4% by weight, based on iron." The particle size limitation ("average crystallite size of less than 2 μm ") has been moved to dependent Claim 79.

Exhibit 4 discloses the production and analysis of various iron (II) sulphate monohydrate-containing precipitates, which were produced by concentrating iron (II)

sulphate monohydrate-containing used sulphuric acid. At page 4 of Exhibit 4, in the table entitled "Filter Salt" the Ti/Fe concentrations of the precipitates are set forth. Applicants note that Samples A and D have a Ti/Fe ratio are outside of the range set forth in Claim 63, as amended. Sample G was a commercial iron (II) sulphate monohydrate obtained from Melspring International B.V. having a Ti/Fe ratio of 0.8% by weight, and thus was also outside of the claimed range. A Verification signed by Dr. Gerhard Auer is attached to Exhibit 4(a).

IBAC tested the chromate reducing efficacy of the iron (II) sulphate monohydrates in cement, and the results are set forth in Exhibit 3, Section 3. The amount of the reducing agent added to the cement was adjusted to produce a stoichiometric ratio of reducing agent to chromate content of either 8:1 or 12:1. The materials were blended and shaken for 24 hours, and the chromate content was determined by two different methods (Table 1 and Table 2). Applicants are in the process of obtaining a Verification in the form of a declaration for Exhibit 3 and will promptly submit the Verification in the present application.

The Examiner's attention is directed to Example E, which has a Ti/Fe ratio of 10.15% and is substantially better than either Sample A (Ti/Fe ratio of 0.56%) and Sample G (Ti/Fe ratio of 0.8%). The results reflect an unexpected correlation between the Ti/Fe ratio in the claimed range (i.e. 5 to 15% by weight) and chromate reducing efficacy in cement. The improved chromate reducing effect achieved by the claimed iron (II) sulphate monohydrate-containing precipitate, wherein the precipitate has a titanium content of 5 to 15 % by weight, based on iron, is unexpected. Applicants note that evidence of unexpected results is strong evidence of nonobviousness, based on the authorities stated above, as well as MPEP § 2145.

Conclusion

The methods of reducing the chromate content in cement set forth in the pending claims have been demonstrated to provide unexpected and significant improvements, relative to the prior art cited by the Examiner. Applicants submit that the application is condition for allowance and respectfully request the same.

Sincerely,



Timothy J. Monahan
MONAHAN & MOSES, LLC
Registration No 32,481
USPTO Customer # 52554
Attorney for Applicant

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MONAHAN & MOSES, LLC
13-B West Washington Street
Greenville, SC 29601
Telephone: (864) 241-4604
Facsimile: (864) 241-4606
E-mail: tim.monahan@momolaw.com